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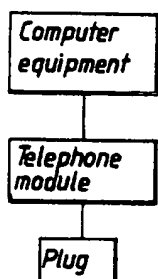
With international search report.

(54) Title: ARRANGEMENT FOR ACQUISITION OF SERVICES VIA A TELEPHONE SET

(57) Abstract

The invention relates to an arrangement for acquisition of services via a telephone set. The arrangement comprises a communication element which connects the calling service purchaser to a service provider station with associated computer equipment. The arrangement contains a reader unit which operates in conjunction with an identity element for communicating with the computer equipment. The identity element is provided with information for identifying the purchaser. The identity element is preferably a smart card and the communication element comprises a reader unit which, together with software, can handle smart cards. The arrangement has a built-in keyboard for feeding in data.

SERVICE PROVIDER

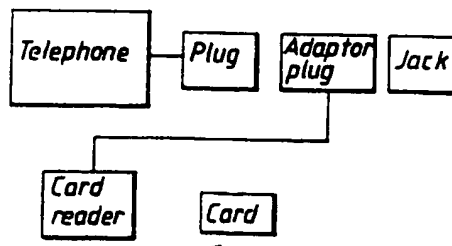


TELEPHONE NETWORK

Jack

Telephone exchange

SERVICE PURCHASER



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AT	Austria	FI	Finland	MI	Mali
AU	Australia	FR	France	MN	Mongolia
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TITLE OF THE INVENTION: ARRANGEMENT FOR ACQUISITION
 OF SERVICES VIA A TELEPHONE
 SET

5 FIELD OF THE INVENTION

 The present invention relates to an arrangement
for acquisition of services via a telephone set, more
specifically a reader which is coupled to the telephone.
The reader contains a reader unit which, together with
10 software, can handle smart cards. The reader can communi-
cate with a receiver at the service provider end. The
arrangement has a built-in keyboard for feeding in data.

 The arrangement is controlled in its entirety
from the telephone service which the service purchaser is
15 ringing. This can be a voice answering equipment or any
other equipment which is built for communicating with a
reader for smart cards. The reader is controlled via any
one of the two accessible communication channels.

PRIOR ART

20 It has previously been known to order services
from a computer equipment via telephone. In this case,
the computer is controlled with the aid of the key set on
the telephone set and information is obtained from the
computer in the form of speech which is generated by the
25 computer. The user himself must keep track of all codes
for identification and different instructions to the
computer.

 Automatic banking machines are also already
known. In these, a card is introduced which identifies
30 the user. The user then requests an amount and feeds in
his personal identification code via the key set on the
terminal. The automatic banking machines only provide
limited services, withdrawal and account information, and
the bank card only contains a code which identifies the
35 account.

SUMMARY OF THE INVENTION

The present invention relates to an arrangement for the acquisition of services via a telephone set with increased possibilities. Several different services can be provided and the safety functions can be improved.

According to the invention, the arrangement comprises a communication element which couples the calling service purchaser to a service provider station with associated computer equipment. The communication element operates in conjunction with an identity element, preferably a smart card, for communicating with the computer equipment. The identity element is provided with information for identifying the service purchaser, among others.

Other embodiments of the invention are specified in greater detail in the subsequent patent claims. Service providers can increase the security of the existing applications or develop new services with the aid of the reader. Security is guaranteed by the security functions which are built into smart cards. Among other things, these cards can encrypt and sign electronic transactions which, together, have the result that service providers can offer very advanced services via the telephone network. A smart card which is used as information carrier can use the reader for transmitting the stored information items.

SHORT DESCRIPTION OF THE DRAWINGS

The invention will now be described in detail with reference to the subsequent drawings, in which:

Figure 1 is a block diagram of the arrangement according to the invention connected to a telephone system; and

Figure 2 is a block diagram of an alternative coupling of the arrangement according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

Figure 1 shows the arrangement according to the

invention coupled to a telephone system. The arrangement is located at the subscriber who is a service purchaser. A connection can be coupled via a telephone system, for example the general telephone network, to a service provider, one of which is shown. At the service provider station, a computer and communication equipment are located.

The arrangement according to the invention consists of a card reader for smart cards. The reader is connected in parallel with the telephone to a normal telephone jack via a standard adaptor plug. The reader contains a reader unit which, together with software functions, can handle smart cards. The reader can communicate with the receiver at the service provider station either by means of tone dialling signalling and/or by means of a modem. It also has a built-in keyboard for feeding in data. The reader is completely controlled from the telephone service which the user is calling. The computer equipment of the telephone service normally has a voice answering equipment or other equipment intended for communicating with a reader. The reader is controlled via any one of the two communication channels which are accessible, by means of tone dialling signalling or modem.

Figure 2 shows an alternative way for connecting the reader. The reader is here directly connected via its plug to the telephone network and the telephone set is coupled directly to the card reader. Here, too, the reader and the telephone set are coupled in parallel.

It is also possible to build the telephone set and the card reader together to form one unit. In this case, the unit has only one key set and a slot for introducing the smart card.

The reader is controlled by a central processing unit. This is an eight-bit central processing unit designed for maximum integration of the card reader's functions directly in the central processing unit. The central processing unit is made in CMOS technology which ensures low current consumption. Internally, there is a

random-access memory RAM with 256 bytes which is adequate for the functions to be carried out by the reader. The program code can be stored in a programmable read-only memory PROM or mask-programmed directly in the central processing unit for minimising current consumption and price.

The card reader is equipped with a built-in keyboard which contains 12 keys: the digits 0-9 and characters * and #. The appearance corresponds to key sets of normal tele-phones. The keyboard is directly coupled to the central processing unit which eliminates the risk of leakage of information fed in.

The reader unit itself is designed for being mounted directly on the circuit board which is important for keeping down the total size and price of the construction. The reader unit is adapted to be able to handle all smart cards on the market. The reader unit is completely passive and is only a link between the card and the central processing unit. The central processing unit can communicate with the card via the reader unit and contribute power supply and clock. Different feed voltages and clock frequencies are supplied to the card depending on which card is connected.

The basic communication with the computer equipment called occurs with the aid of tone dialling signalling. The reader is equipped both with tone dialling transmitter and receiver.

The transmission speed is normally 10 characters (10 x 4 bits) per second. The tone dialling receiver is coupled in parallel with the normal telephone traffic which means that it can receive data both from the user's telephone and from the telephone network. The reader also contains a relay for disconnecting the user when the reader and the service provider's equipment are directly communicating with one another.

Since tone dialling signalling greatly limits the amount of data which can be transferred, the reader is also equipped with a built-in modem. The modem can handle communication according to CCITT V.21 and V.23 which

provides a transmission speed of up to 1200 bps. This gives higher flexibility with respect to the functions to be executed by the reader.

5 The reader is also provided with a number of light-emitting diodes in different colours, the functions of which are described below.

The reader is built up of low-current components but the component with the highest current demand is the smart card. Since different cards are being used, the
10 current consumption cannot be calculated accurately. Moreover, the cards draw more current when they are being written on, so the current consumption varies with time.

The power supply is provided by a battery or by a battery eliminator. A 9-V alkaline battery supplies
15 continuous drive for the reader for approximately 3-4 hours. One of the abovementioned light-emitting diodes indicates low battery voltage and need for exchanging the battery.

When a card is inserted into the reader unit of
20 the reader, the reader automatically starts. When the card is pulled out, the reader is shut down. Since smart cards are dependent on the power supply from the reader, they are returned to rest position when they are pulled out of the reading unit. When the reader is started by
25 inserting a card into the reader unit, a yellow light-emitting diode is illuminated. The reader tests the card in order to identify the type of smart card which is being used. If the card is recognised, the yellow light-emitting diode is extinguished and the reader is ready
30 for use. This means that the reader proceeds to listen to tone signals which are sent from the called system. If the reader does not recognise the card as one of the acknowledged types, the card is either of an unknown type or misused. A red light-emitting diode is then illuminat-
35 ed and the reader waits for the card to be pulled out. All calls to the reader then only produce an error message as response.

The user can feed data in locally to the reader with the aid of the keyboard. The information items fed

in can then be used as data for an instruction to the card. The most usual type of information fed in is a personal code which will be tested in the card but it can also be another type of data, for example information to be encrypted. None of the operations at the keyboard will be output in plain text on the telephone line. The reader accepts the input from the keyboard after an instruction from the called system. When this happens, a green light-emitting diode is illuminated in order to indicate that the data will be fed in. The input is concluded with "#" and the green light-emitting diode is extinguished. When the light-emitting diode is extinguished, no operations at the keyboard will be stored or sent out on the line.

In the connected condition, the reader continuously listens to the data in the form of tone signals or via the modem, which are sent from the called system. When a start character is detected, the reader interprets this as a start of an instruction. The telephone is then disconnected from the line and the reader changes into instruction mode. The reader now collects all data including the signal "#", which indicates the end of the instruction. If a holdup of more than one second occurs between the different characters, the instruction is considered to be disturbed and the reader goes back to looking for the start character. When the entire instruction is received, it is decoded and executed. After the executed instruction, the reader always sends back a response. After that, the telephone is connected again to the line and the reader goes back to listening. When the modem is connected, the user is always disconnected from the line. From the moment the reader has detected the start character to the time when the reader has sent out the complete response, the yellow light-emitting diode is lit.

The reader always starts in tone dialling mode, that is to say it listens for tone dialling signals from the called system. An instruction can be used for changing communication channel and instead coupling in the modem. Thus, a number of different operating

conditions are obtained: tone dialling signalling and signalling by means of the modem with different transmission speeds. The operating condition of the modem can be changed while modem traffic is in progress by means of a new instruction on the modem line. This provides, for example, the possibility of switching between 1200/75 bps as transmission speed. The response to the instruction is always given on the communication channel on which the instruction is sent, tone dialling or modem. Only after the response has been sent out does the exchange of communication channel or operating condition of the modem occur.

The reader can be commanded to accept data from the user via the keyboard by sending an instruction. The green light-emitting diode is illuminated in order to indicate that there will be input from the keyboard. The inputting is concluded by the user pressing the # character. The green light-emitting diode is extinguished when inputting is concluded. The user has a maximum of 30 seconds for feeding in data. If inputting is not concluded within this time, an error code is returned instead. This instruction is normally used for accepting the personal identification code which is to be used for opening the connected card.

An instruction can be directly sent to the connected card. The reader waits for a response from the card and then sends this back. The reader waits for the response for a maximum of 30 seconds. After that, an error code is returned instead. The reader only examines the length of the instruction as a check that a sufficient amount of data has been sent over. Otherwise, there is no check of the instruction. It is the task of the calling system to see that the instruction follows the specification for the connected card.

If data have been fed in from the keyboard, they can be transmitted to the connected card by means of a special instruction. The input data are stored in the keyboard buffer and transmitted to the card together with the instruction. Here, too, only the length of the data

in the keyboard buffer is checked.

EXAMPLE

The arrangement according to the invention can be used for obtaining bank services. The service provider station is therefore the computer equipment of a bank for checking different accounts. The service purchaser is an account owner who has been allocated a smart bank card. To use the card, the user first calls up the bank via the telephone set and feeds the card into the card reader. When communication has been established, the computer equipment senses what the card is and what account is accessible. The user confirms his authorization by feeding in his personal identification code which is usually secret. The user can then obtain information on various accounts, carry out transactions and obtain other services by inputting requested information by means of the keyboard. At the same time, the computer equipment and the smart card automatically interact for transmitting information.

The card reader can be based at the account owner's home. It is also conceivable that the card reader is generally accessible, for example at post offices and banks. After each transaction, the user can be requested to sign the transaction by inputting a further code.

The arrangement according to the invention can also be used for obtaining services from a pharmacy. The card can then be programmed with a prescription, medical status or the like on a visit to the hospital or to the doctor. The card can also specify the amount of medicine which is dispensed within a certain time. The card user can use the card for ringing in prescription orders to the pharmacy. The card and the computer equipment at the pharmacy then interact so that the correct medicine is dispensed. The card keeps track of how much medicine is dispensed and within what time.

The arrangement according to the invention can also be used as means for payment for purchases by telephone. A video film hire shop, for example, can sell

cards which have been programmed with a certain number of films in the form of units which are counted down with each purchase or hire. The smart card then has the function of a credit card or payment card.

- 5 Other embodiments of the invention are apparent to an expert in the field. The invention is only limited by the patent claims following.

	Key 1	SERVICE PROVIDER
	Key 2	TELEPHONE NETWORK
	Key 3	Computer equipment
	Key 4	Telephone module
5	Key 5	Plug
	Key 6	Jack
	Key 7	Telephone exchange
	Key 8	SERVICE PURCHASER
	Key 9	Telephone
10	Key 10	Plug
	Key 11	Adaptor plug
	Key 12	Jack
	Key 13	Card reader
	Key 14	Card
15	Key 15	Telephone
	Key 16	Plug
	Key 17	Plug
	Key 18	Jack
	Key 19	Jack
20	Key 20	Card reader
	Key 21	Card

PATENT CLAIMS

1. System for accessing services via a telephone set, calls being effected by means of an associated identity device, e.g. a smart card, from a telephone set/telephone subscription or similar in a telecommunications system, the identity device being applied to the telephone in question for connection of the telephone set/subscription to a service-providing station connected to the telecommunications system, and means comprising call-receiving devices connecting the service-providing station to the calling party, computer equipment with e.g. an announcing computer with which the calling party communicates, during a connection effected between the calling party and the computer equipment the latter identifying the calling party by means of data existing/programmed in or on the identity device, after identification the calling party, possibly at the request of the computer equipment, inputting an authorisation code assigned thereto, e.g. by dialling a code on the telephone, the authorisation code initiating the access to the service for the calling party at the service-providing station, characterized by the combination of

a communication device connecting the calling party to a service-providing station with associated computer equipment, an identity device in the form of a smart card provided with data for identification of the calling party, the reading unit being controlled by the computer equipment at the service-providing station.

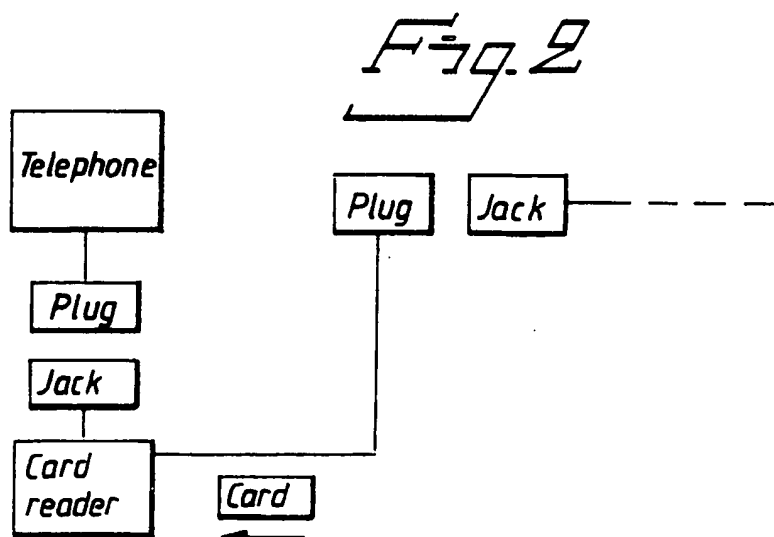
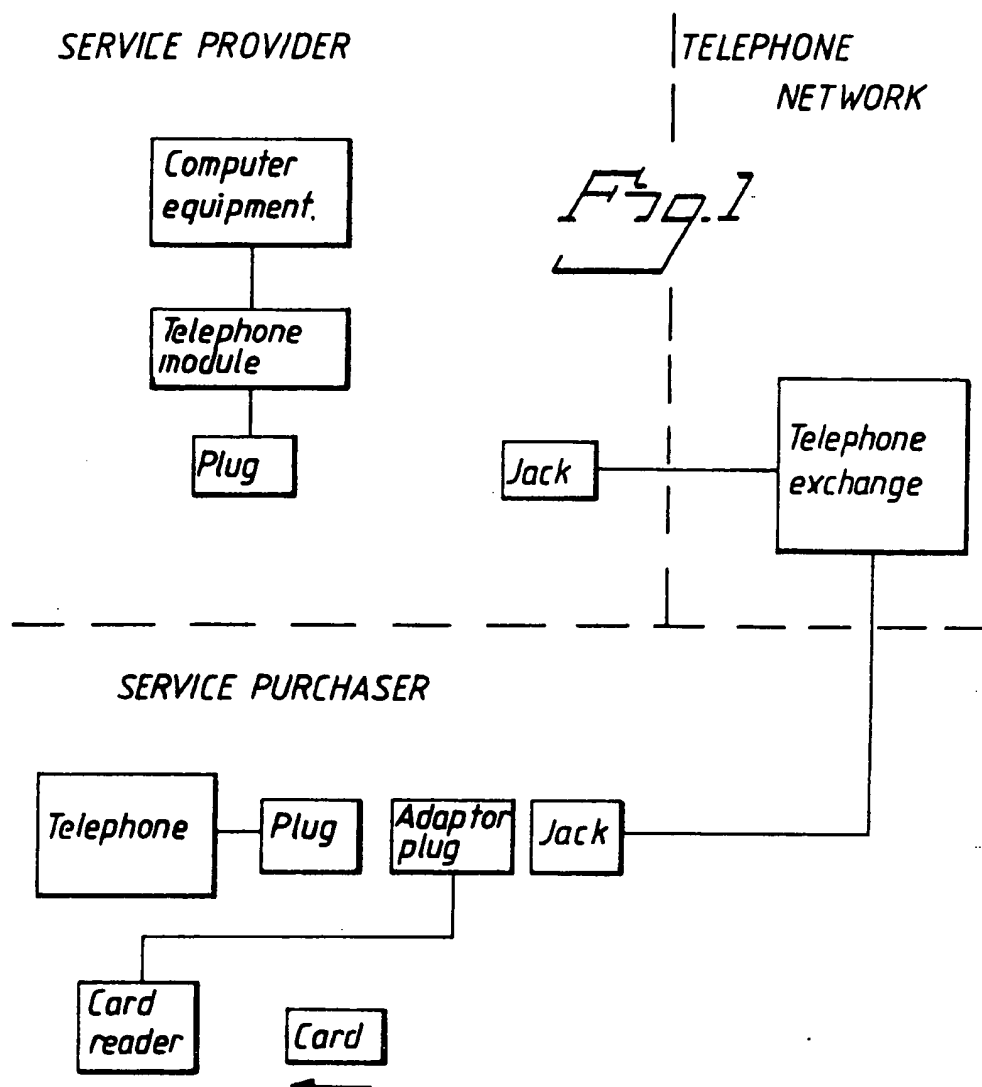
2. Arrangement according to Claim 1, characterised in that the communication element comprises a keyboard for inputting information to the identity element and computer equipment.

3. Arrangement according to any of the preceding claims, characterised in that the communication element is equipped with tone signal transmitter and receiver.

4. Arrangement according to any of the preceding claims, characterised in that the communication element is equipped with a modem.

5. Arrangement according to any of the preceding claims, characterised in that the communication element is connected to the telephone system in parallel with the telephone set, preferably by means of an adaptor plug.
- 5 6. Arrangement according to any of the preceding claims, characterised in that the communication element is built into the telephone set which is provided with a slot for feeding in the identity element.
7. Arrangement according to any of the preceding
10 claims, characterised in that the service purchaser is requested by the computer equipment to feed in an authorization code for the required service to become accessible and/or for confirming the required transaction.
8. Arrangement according to any of the preceding
15 claims, characterised in that the service-providing service station consists of a bank, mail order firm, film hire shop or pharmacy.
9. Arrangement according to Claim 9, characterised in that, in the case of the pharmacy service, information
20 about prescription, medical status and the like is introduced on the identification element.
10. Arrangement according to any of the preceding claims, characterised in that, in the case of a sales function, the identity element is provided with units
25 which can be counted down, for example a number of goods, which are counted down on the basis of the use of the identity element.
11. Arrangement according to any of the preceding claims, characterised in that two-way communication occurs in several steps between the computer equipment and the calling party.
12. Arrangement according to any of the preceding claims, characterised in that a service or goods ordered by the calling party can be signed by the calling party by the computer equipment sending back a request for further identification from the calling party.
13. Arrangement according to any of the preceding claims, characterised in that the computer equipment is arranged to provide acknowledgement/voice response with respect to the service requested by the calling party.

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**SUBSTITUTE SHEET**

INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 92/00293

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC5: G 07 F 7/08; H 04 M 11/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC5	G 07 F; G 06 K; H 04 M	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched ⁸		
SE,DK,FI,NO classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category [*]	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	EP, A1, 0379333 (GRAVES, MARCEL ALBERT) 25 July 1990, see column 2, line 45 - column 4, line 12; figures 1-3 ---	1-13
A	GB, A, 1396150 (STANDARD TELEPHONES AND CABLES LIMITED) 4 June 1975, see figures 1-2; claims 1-10 -----	1-13
<p>[*] Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
12th August 1992	1992 -08- 17	
International Searching Authority	Signature of Authorized Officer	
SWEDISH PATENT OFFICE	HAKAN OLSSON	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 92/00293**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on 01/07/92
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0379333	90-07-25	AU-D- 4781590	90-07-26
		JP-A- 2271466	90-11-06
GB-A- 1396150	75-06-04	DE-A- 2356695	74-05-30